amount of closed magnetic shells and solenoids. It will thus be seen that even if we take the internal and external sources to be detached, the plain proposition given by Prof. Schuster would appear to require a modifying clause in order to be exact. A. TANAKADATE.

Physical Laboratory, Imperial University, Tokyo, August.

A Polarisation Pattern.

THE following may be of interest to some of your readers. A cylindrical mica chimney of an Auer gas-light is placed vertically on a varnished table. If we look through it at the diffused daylight from a window reflected by the table, faint coloured bands are seen running parallel to the length of the cylinder near both edges. If observed through a Nicol's prism, the band appears very beautiful.

T. TERADA.

Physical Laboratory, Science College, Imperial University, Tokyo, September 8.

A Focusing Screen for Use in Photographing Ultra-violet Spectra.

THE sensitive surface upon which Stokes projected the ultra-violet rays when observing metallic lines and absorption spectra consisted of a plate of plaster of Paris moistened with a paste of uranium phosphate acidified with phosphoric acid (*Journ. Chem. Soc.*, vol. xvii., 1864). Soret used uranium glass and solutions of fluorescent substances such as æsculine in liquid cells. I have found that the most convenient and effective screen for examining spectra with a quartz spectrograph is one such as is used for the X-rays. It may be made as follows:—a photographic plate is first cleared of silver bromide by fixing and washing, and when the film is partly dry, but the gelatin still soft, it is dusted over with a powder of barium platinocyanide crystals, so as to be somewhat thickly coated with the salt. This is fixed in the dark slide of the camera. To focus a spectrum, the slide is tilted to the necessary angle, and a somewhat powerful focusing glass with a flat field is applied to the uncoated surface of the plate, when both the visible and ultra-violet spark spectra may be plainly seen by transmission, the latter by reason of the fluorescence excited. The focusing glass should be first carefully adjusted for any visible object on the other side of a plain glass plate, such as a fine hair fastened upon it, and the position of the eye-piece is then fixed. Suitable focusing glasses are those made by Dallmeyer and by Taylor, Taylor, and Hobson. When the spectrograph has been adjusted by means of the screen, the ultra-violet lines appear quite as sharp as those in the red and yellow, even the details in the group of cadmium lines between wave-lengths 2100 and 2400 are well defined, and a very fair photograph may be obtained; but for the most accurate focusing photography must be resorted to. W. N. HARTLEY.

Royal College of Science, Dublin, October 2.

The Omission of Titles of Addresses on Scientific Subjects.

THE published reports of the British Association make an omission of an equal and opposite character to that about which your correspondent complains. Perhaps these are intended to cancel out. I refer to the publication of titles only, without any text. On receiving the last report (1904, Cambridge) I analysed this matter so far as it relates to Sections A and G, in which I am most interested. In Section A there were 83 communications, 29 of which appear by title only, and of these publication elsewhere is referred to in foot-notes in 4 cases, leaving 25 to the recollection of the audiences who heard them. Section G was better. There were 25 communications, and 13 appeared by title only; but of these 9 may be traced by those who take the trouble to consult the other publications referred to in the foot-notes. A. P. TROTTER.

Westminster, October 3.

THE INTERNATIONAL CONGRESS ON TUBERCULOSIS.

THE International Congress on Tuberculosis, held in Paris on October 2–7, has undoubtedly served as a medium for a most fruitful interchange of views by those interested in the struggle against tuberculosis. The congress was held in the Grand Palais, which from its extent enabled the members to be collected under one roof. The first day was devoted to the formal opening, when the delegates were welcomed by the President of the French Republic, who also after the close of the congress gave a reception at the Palais de l'Elysée. The chief social functions, which were characterised by complete success, comprised a reception at the Hôtel de Ville by the Municipality of Paris, an "at home" by the *Figaro*, at which performances were given by well known artistes, a soirée at the Hôtel Continental given by the president of the congress, Dr. Hérard, another at the Châtelet Theatre by the *Matin*, and a visit to Vaux de Cernay on the invitation of Dr. Henry de Rothschild.

The British Government was represented by Dr. Theodore Williams and Dr. Bulstrode, the National Association for the Prevention of Consumption by Sir William Broadbent and Dr. Perkins, while the foreign Governments and all the leading medical societies and institutions had their special official representatives.

The chief feature of the congress was reserved for the closing *séance*, when Prof. v. Behring announced that he had every reason to hope he had discovered a method of treating tuberculosis which would be as efficacious as the anti-toxin treatment of diphtheria he had first proposed in 1890.

His statement, received with great enthusiasm, was to the effect that, although he had made a great step, the value of his proposed procedure must be tested on animals in other laboratories than his own, and clinically by physicians with an intimate knowledge of the varieties of pulmonary tuberculosis, before it could be said that an actual curative medium had been found.

Prof. Behring, as had been anticipated, gave no exact details as to the method of obtaining or administering his latest therapeutic discovery, but the earlier stages of his work are to be explained in a forthcoming book entitled "Modern Problems of Phthisiogenetic and Phthisiotherapeutic Physiology illuminated by History."

His experiments have led him definitely to abandon the idea of introducing living tubercle bacilli into the human body with a therapeutic object. He has discovered a substance, to which he has given the name T.C., which represents the vital principles of the tubercle bacillus of Koch. To the presence of this substance, which possesses extraordinary fermentative and catalytic properties, is due both the hypersensibility of living organisms to Koch's tuberculin and the protective reaction against tuberculosis. This T.C. impregnates and becomes an integral part of the cells of any organism with which it comes in contact, undergoing a metamorphosis into another substance to which the name T.X. has been given.

This elaboration of T.C. in the organism is a long and perilous process. Prof. v. Behring claims to have succeeded in producing this change *in vitro* by freeing the T.C. from certain substances which impair its therapeutic action. Of these he distinguishes three groups:—(1) a substance (T.V.) only soluble in pure water, and possessing a fermentative and catalytic action. To the presence of this substance are due the toxic effects of Koch's tuberculin. One gram of this in the dry state is more toxic than a litre of the old

tuberculin. (2) A globulin (T.G.L.), soluble in neutral saline solutions, and also toxic. (3) Several non-toxic substances soluble only in ether, chloroform, and the like. The residue of the tubercle bacillus after the removal of the foregoing he terms the restbacillus; this still retains the form and staining reactions of the original tubercle bacillus. The restbacillus can be converted into an amorphous substance readily taken up by the lymphatic cells of animals undergoing a metamorphosis and leading coincidently to the production of oxyphil granules in these cells and of immunity to the tubercle bacillus in the organism as a whole.

Prof. v. Behring has convinced himself that this T.C. can be elaborated *in vitro* in a fashion which will enable it to be applied efficaciously and without danger in human therapeutics, but until this has been confirmed he does not propose to publish his full results.

The scientific interest of the congress naturally divided itself into two parts, the exhibition of pathological specimens, of models, photographs, and plans of sanatoria, instruments, sterilising machinery, and the like in the museum on the ground floor of the Grand Palais, and the actual communications made to the congress. Both presented features of great importance. Among the exhibits of more especial interest were a series of specimens indicating the results of inoculation of bovine, human, and avian tubercle in different animals, lent by the Gesundheitsamt of Berlin, and a similar series shown and thoroughly demonstrated by Dr. Lydia Rabinowitsch. The latter observer had been able to show the varying grades of virulence of the tubercle bacilli from different sources, but had not been able by transference through different animals to convert bacilli with the cultural properties of bovine bacilli into those with the cultural characters of human tubercle bacilli and *vice versâ*, although this could not be seen from the naked-eye appearance of many of the specimens. Neither had she so far repeated Nocard's results of converting avian into human or human into avian bacilli, although she exhibited an example of a bird which had suffered, apparently spontaneously, from tuberculosis, in which the cultural appearances were those of human bacilli. Dr. Calmette, of the Pasteur Institute of Lille, showed an important series of specimens from goats and kids. Kids which had been fed on the milk from mothers the mammæ of which were infected with bovine tubercle presented caseation of the mesenteric glands and also pulmonary lesions, apparently spreading through the peribronchial glands and lymphatic chain, although the retropharyngeal chain of glands remained uninfected. In cases in which the mothers had been inoculated with human or avian tuberculosis or with the Timothy bacillus only the mesenteric glands were infected. Adult goats to which doses of a culture of bovine tubercle had been administered through an œsophageal tube always died rapidly of *pulmonary tuberculosis* without apparent intestinal lesions and only a few scattered points of caseation in the mesenteric glands. Nothing approaching the degree of mesenteric affection seen in kids was found. This confirms Prof. v. Behring's announcement in 1903 that pulmonary tuberculosis might result from intestinal infection without producing local lesions at the point of entry. The Alfort Veterinary College showed a series of specimens, and others were to be seen in the museum of the college, which members of the congress were invited to visit. Amongst others were examples of the comparatively rare tuberculosis of the horse, and evidences that dogs suffer severely both from pulmonary and intestinal tuberculosis. Prof. G. Petit, of Alfort, has shown that such affections are steadily on the increase, and constitute an important factor in the campaign against tuberculosis, since a household otherwise protected to the best of human ability may become infected by a pet dog, which, having acquired tuberculosis in the streets or elsewhere, subsequently lies on the bed of children and licks their faces. The tuberculosis of dogs is more often open than had been anticipated; this means that tubercle bacilli would be constantly about their mouths, and so be readily transferred. The most common organism is the human bacillus, and the dogs most affected are those from small cafés where the air is constantly full of dust and dried sputum.

In the hygienic section were full size models showing the ordinary hotel room with its heavy hangings and dust accumulation, and the same room as it should, and could at less cost, be properly furnished with easily disinfected materials. Another group showed the great superiority in light, air, and general hygiene of a prison cell over the attic rooms with skylights, often not opening, in which most servants in Paris are accustomed to sleep.

For the purpose of receiving communications the congress was divided into four sections, the first two dealing with medical and surgical pathology and therapeutics respectively, the third with the protection of infant life, and the fourth with the protection of the adult and social hygiene.

In many subjects the two former sections overlapped, especially in dealing with the nature and varieties of tuberculosis and the value of serotherapeutics. The general conclusions appeared to be that the morphological appearances of the different varieties of the tubercle bacillus and other acid-fast bacilli were very similar, but that cultural differences existed, and that there were wide variations in toxicity. Special reports were made on this subject by Profs. Arloing, Kossel, and Ravenel. These showed that the infection of man by bovine tubercle bacilli, which are the most virulent, could occur through feeding with the unsterilised milk of tuberculous cows. All mammals appeared to suffer from infection by both types of bacilli, but no other type of mammalian bacilli could be established from cultural or morphological characters. So far as was known, tubercle bacilli modified in virulence by passing through animals other than mammals could be ultimately traced to a human or bovine origin, and restored by passage through cultures and other animals to their original forms. While the general impression seemed to be that the tubercle bacillus is in reality but one species, it was admitted that no evidence of transformation of the one type into the other, in cultural characters at any rate, had so far been produced, although varying grades of virulence in each type were recognised.

In a general study of acid-fast bacilli, Drs. Besançon and Philibert distinguish between true acid-fast bacilli which remain so under all conditions of culture, growth, and passage through animals, and those which for a single generation have acquired acid-fast characters.

They found that many bacilli grown on appropriate media containing fats, of which lanoline was the best, acquire the power for some time of resisting decolorisation by acids or by acids and alcohol. Subcultures grown on similar fatty media are also acid-fast, but subcultures on ordinary media possess no such power. To distinguish between these groups it was necessary to stain for a longer period than usual, and then to expose the films to the action of acid for many hours.

When deeply stained the tubercle bacillus will resist decolorisation for twelve to eighteen hours; the

pseudo-acid-fast bacilli resist for much shorter periods.

During the discussions on serotherapy it was stated that good results had been obtained by treatment with filtered broth cultures of tubercle bacilli as employed by Prof. Denis, of Louvain, with a new variety of tuberculin extracted from tubercle bacilli by means of a 1 per cent. solution of orthophosphoric acid introduced by Dr. Beraneck, of Neuchatel, and with the anti-toxic serum invented by Dr. Marmorek. The latter observer had made a medium of leuco-toxic serum, obtained by injecting goats with leucocytes of other animals, and spleen bouillon, and inoculated this from the very edge of young cultures of tubercle bacilli. These showed a rapid growth, and the products of their growth in this medium were injected into horses in repeated small doses; when these horses had been sufficiently immunised their blood was used as a source for the serum. This serum had given its best results in cases of surgical tuberculosis, *i.e.* diseases of joints and the like, but the effects in pulmonary tuberculosis were held to be such as to justify a more extended trial being given to this method.

In the subsection on therapeutics various methods of treatment were put forward, amongst others the intravenous injection of iodoform in suspension in a mixture of ether and liquid paraffin which had been tried with some success by Dr. Dewar, of Dunblane.

Several communications were made on the respiratory changes in the subjects of pulmonary tuberculosis, the general conclusion being that they in no wise differed from those in normal or slightly febrile individuals. A series of reports was made on the early diagnosis of pulmonary tuberculosis by radiography, cytoscopy, blood counts, and other methods. Dr. Theodore Williams pointed out that the time had not yet come for supplanting the ordinary methods of auscultation and percussion, an opinion strongly agreed to by Prof. Grancher and Dr. Turban, of Davos.

In the third section abundant evidence was given of the necessity of proper care being taken of children, especially to avoid infection, great stress being laid on the danger of their occupying the same room as a subject of pulmonary tuberculosis, and the absolute necessity for a properly supervised milk supply. In a general resolution of the congress it was decided to recommend the periodical Government inspection of all dairies, and that no public institution should make use of milk that had not either come from cows which had passed the tuberculin test or had been Pasteurised or boiled.

In the fourth section Dr. Newsholme directed attention to the diminution in the death rate from pulmonary tuberculosis which had followed the replacement of domestic by institutional relief.

A discussion on the relative merits of sanatorium and dispensary treatment resulted in the conclusion that each had its place, and that the educational factor must not be forgotten, since the diminution of tuberculosis depended more on prophylaxis than on individual treatment. The advantages of the French dispensaries over the out-patient departments of most English hospitals were that since one or more of these are situated in each district of Paris and other cities, patients have not far to come, and domiciliary visits could be made to encourage the carrying out of any precautions recommended. Owing to the distance from which patients come this was at present quite impossible to organise for London hospitals. Such a system had, however, been organised in connection with the dispensary attached to the Victoria Hospital in Edinburgh, and had been productive of most excellent results. It was in matters connected with hygiene and social factors generally that the most good resulted from the London congress, and it is to be hoped still more will follow the narration of the experience gained since that time. The real hope for the community as a whole would appear to lie in the protection of the individual, and more especially of the child, if Prof. Behring's views on latency and intestinal infection hold good, from infection rather than in the treatment of those already tuberculous, since even if treatment restore the latter to some degree of working capacity, and the average sanatorium result is put at five to seven years' prolongation of active life, they but serve as foci for fresh infection.

In addition to the actual scientific papers brought forward, perhaps the greatest and best work of the congress consisted in the private interchange of views between workers of different nationalities, and in the visits to various institutions, sanatoria, and hospitals in and around Paris.

The Pasteur Institute, the veterinary college at Alfort, the Boucicaut Hospital and the sanatoria at Bligny, Angicourt, and Ormesson were among those inspected by the greatest numbers.

At the concluding *séance* it was announced that the next congress would be held in America in three years' time.

THE BRITISH ASSOCIATION IN SOUTH AFRICA.

THE association party left Maritzburg early on Saturday morning, August 26, and proceeded through the upland districts to Colenso, where a halt of special interest had been arranged. Arriving at that now historic centre with some hours of daylight to spare, a visit was paid to the site of several battles and engagements connected with the attempts to relieve Ladysmith.

The next morning, August 27, the trains slowly steamed through one of the passes leading into Ladysmith, where evidence of the severity of the struggle of a few years ago was seen on every side in groups of graves and monuments. Ladysmith was left in the evening, and Majuba and Laing's Nek, with the scenes of struggles in the late war in northern Natal, were passed in the darkness. Daylight revealed Standerton in the Transvaal at hand, and Johannesburg was reached amid exclamations of wonder at the gigantic heaps of tailings from the gold workings which were passed during the last few miles of the journey.

Of the work done in Johannesburg in connection with the sections little need be said here, but the attendances were certainly remarkably good, and the discussions revealed a high average of capacity to discuss the various problems which were presented by the papers read. Prof. Darwin's own words at the close were felt to be fully deserved when he observed, in bringing the formal work to a close, that the meeting of the association in Cape Town and Johannesburg constituted one of the most remarkable and one of the most successful of the long series held in various centres in Great Britain, Ireland, and the colonies.

The more social functions connected with the visit to Johannesburg must be described as brilliant successes. These commenced with a reception by the mayor and town council at a conversazione held at the Wanderers' Club. His Excellency the High Commissioner, Lord Selborne, was present, and graciously received many of the more distinguished of the visitors and those who had been most prominent in preparing for the visit of the association in the different South African centres.